Innovative integrative tools and platforms. Key results of the PREPARE European Project

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Abstract – The European project PREPARE (Innovative integrated tools and platforms for radiological emergency preparedness and post-accident response in Europe) aims at closing gaps that have been identified in nuclear and radiological preparedness following the first evaluation of the Fukushima disaster. It started February 2013 and ended January 2016. Forty-six partners from Europe and Japan, among them universities, national research centres, operational emergency management centres and non-governmental organisations, performed research to close gaps identified following the Fukushima disaster. Among others, the project addressed the review of existing operational procedures for dealing with long lasting releases, cross border problems in radiation monitoring and food safety and further development of missing functionalities in decision support systems ranging from improved source term estimation and dispersion modelling to the inclusion of hydrological pathways for European water bodies. In addition, a so called Analytical Platform was developed exploring the scientific and operational means to improve information collection, information exchange and the evaluation of such types of disasters. The tools developed within the project will be integrated into the two decision support systems ARGOS and RODOS.

Keywords: European project PREPARE / decision support / Fukushima / dispersion / aquatic / communication / trade

1 Introduction

The European project PREPARE (Innovative integrated tools and platforms for radiological emergency preparedness and post-accident response in Europe) aimed at closing these gaps that have been identified in nuclear and radiological preparedness following the first evaluation of the Fukushima disaster. Gaps identified comprised the question if existing EPR (emergency preparedness and response) procedures are fit for dealing with long lasting releases, how to deal with cross border monitoring and food safety and how to improve source term estimation and dispersion modelling as well as improve the modelling of hydrological pathways for European water bodies. Further to these very technical topics, trustworthiness of communication and the information collection and dissemination from one central location were part of the issues indicated by the review.

2 Work program

The PREPARE project was subdivided into seven research and one management activity (see Figure 1). The management activity concentrates in the operation of the project. The research work packages include also activities related to training and dissemination which was of high importance to achieve the objectives to harmonise response in Europe.

- Development of operational procedures for long lasting releases.
- Development of a so-called “Analytical Platform” with the objective to serve as a focal point for the collection of and analysis of information from any nuclear or radiological event, particularly regarding the consequences and any further developments.
- Development of recommendations related to quality control and management of contaminated goods which are applicable to whole Europe, taking into account the viewpoint of all relevant stakeholders (e.g. producers, retailers, consumers and administrations at national and regional levels).
- Improvement of atmospheric components of decision support systems such as ARGOS and RODOS in particular the estimation of a potential source term based on a combination of atmospheric dispersion calculations and
monitoring data around a power plant and the physico-
chemical properties of radionuclides emitted to the
atmosphere.

– Improvement to aquatic aspects of decision support
systems by integrating state of the art aquatic models into
the RODOS DSS and couple them with countermeasure
simulation models.

– Investigate the conditions and means for relevant, reliable
and trustworthy information to be made available to the
public at the appropriate time and according to its needs,
both during the nuclear emergency as well as in the post-
emergency phases.

– Basic training courses in the field of nuclear and
radiological emergency and recovery planning and
response and the organization of specific exercises related
to transport accidents and large scale cross border
contamination monitoring should be organized.

3 Results

After three years of research, the following brief summary
lists the project achievements within the seven work packages:

– Operational procedures for long lasting releases:
Following the Fukushima Daiichi accident a review of
existing EPR procedures for long lasting releases and
identification of possible needs for improvements by
performing scenario calculations has been performed at a
European level. Suggestions for improvements have been
formulated, however, the overall performance of existing
procedures was in most cases appropriate.

– Platform for information collection and exchange:
The so-called Analytical Platform (AP) for information
exchange in times of nuclear or radiological crisis allows
discussion between institutional and non-institutional
experts on an expert-level and to widespread congruent
information on the current situation to the public including
mass media. To support the expert in the analysis, a
knowledge database has been developed, which contains
historic events and scenarios, their propagation with time,
and applied countermeasures and using the methodology
Case-based reasoning (CBR) to find solutions for events
that are not part of the database. Historic cases from
Chernobyl and scenarios prepared with the RODOS
system, approved by experts, populates the data base.
The usage of this tool will be further explored with
interested organisations in Europe.

– Management of contaminated goods: Stakeholder panels
have been prepared and panels have had meetings in
Belgium, Finland, France, Switzerland, Greece, Ireland,
Netherlands, Norway, Portugal, Spain and United
Kingdom to review existing guidance and to identify
areas for improvement. It helps in designing and
strengthening the preparedness plans for post-accidental
situations at the national and local levels in European
countries. A report summarising the results of all panels
was prepared.

– Improvement to terrestrial aspects of decision support
systems: The work here concentrated on the improvement
of the atmospheric dispersion models implemented in the
two DSS ARGOS and RODOS. Two methods for source-
term estimation have been developed and implemented.
A further important work activity was the improvement
of the models with respect to the treatment of particles.
And finally, models have been improved for long-range
transport.

– Improvement to aquatic aspects of decision support
systems: The aquatic model chain of the RODOS system
has been improved in several aspects. The long-term
watershed model MOIRA was integrated into the RODOS
system. The global ocean model MyOcean (MyOcean,
2016) was linked to RODOS allowing to use the
simulations of this model as boundary conditions for
the simulation of radionuclide dispersion in RODOS. The
simulation models were extensively tested for the
Fukushima accident.

– Communication with the public: The overall objective of
the work package was to investigate the conditions and

Figure 1. Dependencies of the PREPARE work packages.
means for relevant, reliable and trustworthy information to be made available to the public at the appropriate time and according to its needs, both during the nuclear emergency as well as in the post-emergency phases. Here traditional and social media have been studied. Important to note is also the interaction with the Analytical Platform activity exploring the involvement of experts and the public in the Platform and what are the rules and conditions that governmental and non-institutional experts interact with each other.

- **Training, exercises and dissemination**: Training and exercising was an important aspect of any RTD development and therefore treated as a separate work package. Training courses for early and late phase aspects in a nuclear or radiological emergency were prepared and conducted. A transboundary monitoring exercise was conducted. Training courses were also prepared and performed for the products developed within the project, in particular for the Analytical Platform. The results were disseminated at the final workshop held in Bratislava, January 2016. Nearly 120 participants from project partners, interested experts and international organisations participated in the event.

### 4 Discussion and conclusions

As a conclusion one can state, that PREPARE improved tools and methods in topics such as long lasting releases, source term estimation, model improvements, knowledge gathering and exchange of trustworthy information. It was clearly driven from the observations during and after the Fukushima incident. PREPARE is a step forward in harmonisation of emergency management and rehabilitation preparedness in Europe as it provides tools and methodologies which are either used in national organisation and implemented in decisions support systems such as ARGOS and RODOS, but also involving non-governmental stakeholders to gather and disseminate trustworthy information.

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**Reference**